

10/748844

f) adding  $\text{CH}_2\text{Cl}_2$  and TFA to the solution and stirring the solution for about 24 hrs

g) evaporating the solvent and drying in vacuum to obtain the desired product..

A process as claimed in claim 22, wherein tertiary butyl ether is either mono butyl ether or di-butyl ether.

A process as claimed in claim 22, wherein low boiling halogenated solvent used is dichloromethane

A process as claimed in claim 22 wherein in step (a), dichloromethane used is free from water.

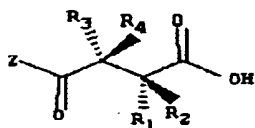
A process as claimed in claim 22 wherein in step (b), stirring is carried out for a period in the range of 5 to 10 hours.

A process as claimed in claim 22 wherein in step (d), dimethylchloride is used in the range of 3 to 10 equivalent.

A Pharmaceutical composition comprising the effective amount of a compound selected from the general formula  $\text{Z-OC}(\text{C R}_{n1}\text{R}_{n2})\text{-CO-Z}$  wherein  $\text{Z} = \text{OH}$  or  $\text{NH}_2$  and  $n1 = n2 = 1$  to 8 along with an additive, excipient, diluents or carrier.

A composition as claimed in claim 29, wherein said compound useful in vaccine formulation to prevent more efficient and faster presentation of antigens to T-cells thereby initiate primary protective Th1 immune response and help in the clearance of the pathogen.

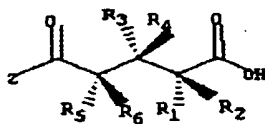
A composition as claimed in claim 29, wherein said compound having a structure as herein and bearing general formula  $\text{ZOC-CR}_3\text{R}_4\text{-CR}_1\text{R}_2\text{-COOH}$  wherein:  $\text{Z} = \text{OH}$  or  $\text{NH}_2$ ,  $\text{R}_1$ , to  $\text{R}_4$  denotes  $\text{H}$ ,  $\text{NH}_2$ ,  $\text{SO}_3\text{H}$ , or  $\text{OSO}_3\text{H}$ ,  $\text{CH}_2\text{-SO}_3\text{H}$ ,  $\text{CH}_2\text{-OSO}_3\text{H}$ ,  $\text{NHSO}_3\text{H}$



Structure 1

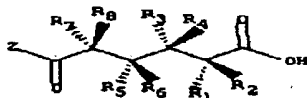
A composition as claimed in claim 29, wherein said compound having a structure as herein and bearing general formula  $\text{ZOC-CR}_5\text{R}_6\text{-CR}_3\text{R}_4\text{-CR}_1\text{R}_2\text{-COOH}$

wherein: Z=OH or NH<sub>2</sub>, R<sub>1</sub> to R<sub>6</sub> denotes H, NH<sub>2</sub>, SO<sub>3</sub>H, or OSO<sub>3</sub>H, CH<sub>2</sub>-SO<sub>3</sub>H, CH<sub>2</sub>-OSO<sub>3</sub>H, NHSO<sub>3</sub>H



STRUCTURE 2

- 32  
33. A composition as claimed in claim 29, wherein said compound having structure as  
5 herein and bearing general formula ZOC-CR<sub>7</sub>R<sub>8</sub>-CR<sub>5</sub>R<sub>6</sub>-CR<sub>3</sub>R<sub>4</sub>-CR<sub>1</sub>R<sub>2</sub>-COOH  
wherein: Z=OH or NH<sub>2</sub>, R<sub>1</sub> to R<sub>8</sub> denotes H, NH<sub>2</sub>, SO<sub>3</sub>H, or OSO<sub>3</sub>H, CH<sub>2</sub>-SO<sub>3</sub>H, CH<sub>2</sub>-  
OSO<sub>3</sub>H, NHSO<sub>3</sub>H



STRUCTURE 3

- 33  
34. A composition as claimed in claim 29, wherein said compound is non-toxic to  
10 monocytes.  
34  
35. A composition as claimed in claim 29, wherein said compound is non-toxic to  
macrophages.  
35  
36. A composition as claimed in claim 29, wherein additives are different divalent  
metal cations such as Mg, Ca and Zn.  
15 36  
37. A composition as claimed in claim 29, wherein additives are amino acid/  
dicarboxylic acid derivatives and their pharmaceutically acceptable selected alkali/  
alkaline earth metal salts.  
37  
38. A composition as claimed in claim 29, wherein the compound is selected from the  
group consisting of:

- 20
- I. [L- Aspartic acid, N-Sulfonic acid],
  - II. [2α,3-dicarboxy, propane-1-sulfonic acid],
  - III. [2α,3-dicarboxy, propane-1-sulfate],

- IV. [1 $\alpha$ ,2-carboxy ethane sulfonic acid],
- V. [1 $\alpha$ ,2-carboxy ethane sulfate],
- VI. [D-aspartic acid, N-sulfonic acid],
- VII. [2 $\beta$ ,3-carboxy,propane-1-sulfonic acid],
- 5 VIII. [2 $\beta$ ,3-carboxy,propane-1-sulfate],
- IX. [1 $\beta$ ,2-carboxy ethane-1-sulfonic acid],
- X. [1 $\beta$ ,2-carboxy ethane-1-sulfate],
- XI. [D-aspartic acid, 3 $\alpha$  -sulfonic acid],
- XII. [D-aspartic acid, 3 $\alpha$ -sulfate],
- 10 XIII. [D-aspartic acid, 3 $\beta$ -sulfonic acid],
- XIV. [D-aspartic acid, 3 $\beta$ -sulfate],
- XV. [L-asparagine,N-sulfonic acid],
- XVI. [2 $\alpha$ -carboxy, 3-carboxamido, propane-1-sulfonic acid],
- XVII. [2 $\alpha$ -carboxy, 3-carboxamido, propane-1-sulfate],
- 15 XVIII. [1 $\alpha$ -carboxy, 2-carboxamido, ethane sulfonic acid],
- XIX. [1 $\alpha$ -carboxy, 2-carboxamido, ethane sulfate],
- XX. [L-asparagine, 3 $\alpha$ -sulfonic acid],
- XXI. [L-asparagine, 3 $\alpha$ -sulfate],
- XXII. [L-asparagine, 3 $\beta$ -sulfonic acid],
- 20 XXIII. [L-asparagine, 3 $\beta$ -sulfate],
- XXIV. [D-asparagine, N-sulfonic acid],
- XXV. [2 $\beta$ -carboxy, 3-carboxamido, propane-1-sulfonic acid],
- XXVI. [2 $\beta$ -carboxy, 3-carboxamido, propane-1-sulfate],
- XXVII. [1 $\beta$ -carboxy, 2-carboxamido, ethane sulfonic acid],
- 25 XXVIII. [1 $\beta$ -carboxy, 2-carboxamido, ethane sulfate],
- XXIX. [D-asparagine, 3 $\alpha$ -sulfonic acid],
- XXX. [D-asparagine, 3 $\alpha$ -sulfate],
- XXXI. [D-asparagine, 3 $\beta$ -sulfonic acid],
- XXXII. [D-asparagine, 3 $\beta$ -sulfate],
- 30 XXXIII. [L-glutamic acid, N-sulfonic acid],

XXXIV. [2 $\alpha$ ,4-dicarboxy, butane-1-sulfonic acid],

XXXV. [2 $\alpha$ , 4-dicarboxy, butane-1-sulfate],

XXXVI. [1 $\alpha$ , 3-dicarboxy, propane sulfonic acid],

XXXVII. [1 $\alpha$ , 3-dicarboxy, propane sulfate],

5 XXXVIII. [1 $\beta$ , 3-dicarboxy, propane sulfate],

XXXIX. [1 $\beta$ , 3-dicarboxy, propane sulfonic acid],

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39. A composition as claimed in claim 29, wherein the compound is selected from the group consisting of:

I. [D-glutamic acid, N-sulfonic acid],

10 II. 2 $\beta$ , 4-dicarboxy, butane-1-sulfonic acid],

III. [2 $\beta$ , 4-dicarboxy, butane-1-sulfate],

IV. [D-glutamic acid, 3 $\alpha$ -sulfonic acid],

V. [D-glutamic acid, 3 $\alpha$ -sulfate],

VI. [D-glutamic acid, 3 $\beta$ -sulfonic acid],

15 VII. [D-glutamic acid, 3 $\beta$ -sulfate],

VIII. [D-glutamic acid, 4 $\alpha$ -sulfonic acid],

IX. [D-glutamic acid, 4 $\alpha$ -sulfate],

X. [D-glutamic acid, 4 $\beta$ -sulfonic acid],

XI. [D-glutamic acid, 3 $\beta$ -sulfate],

20 XII. [L-glutamine, N-sulfonic acid],

XIII. [2 $\alpha$ -carboxy, 4-carboxamido, butane-1-sulfonic acid],

XIV. [2 $\alpha$ -carboxy, 4-carboxamido, butane-1-sulfate],

XV. [1 $\alpha$ -carboxy, 3-carboxamido, propane-1-sulfonic acid],

XVI. [1 $\alpha$ -carboxy, 3-carboxamido, propane-1-sulfate],

25 XVII. [1 $\beta$ -carboxy, 3-carboxamido, propane-1-sulfate],

XVIII. [1 $\beta$ -carboxy, 3-carboxamido, propane-1-sulfonic acid],

XIX. [D-glutamine, N-sulfonic acid],

XX. [2 $\beta$ -carboxy, 4-carboxamido, butane-1-sulfonic acid],

XXI. [2 $\beta$ -carboxy, 4-carboxamido, butane-1-sulfate],

30 XXII. [D-glutamine, 3 $\alpha$ -sulfonic acid],

- XXIII. [D-glutamine, 3 $\alpha$ -sulfate],
- XXIV. [D-glutamine, 3 $\beta$ -sulfonic acid],
- XXV. [D-glutamine, 3 $\beta$ -sulfate],
- XXVI. [D-glutamine, 4 $\alpha$ -sulfonic acid],
- 5 XXVII. [D-glutamine, 4 $\alpha$ -sulfate],
- XXVIII. [D-glutamine, 4 $\beta$ -sulfonic acid],
- XXIX. [D-glutamine, 4 $\beta$ -sulfate],
- XXX. [L-homoglutamic acid, N-sulfonic acid],
- XXXI. [Pentane-2 $\alpha$ , 5-dicarboxy-1-sulfonic acid],
- 10 XXXII. [Pentane-2 $\alpha$ , 5-dicarboxy-1-sulfate],
- XXXIII. [Butane-1 $\alpha$ , 4-dicarboxy-1-sulfonic acid],
- XXXIV. [Butane-1 $\alpha$ , 4-dicarboxy-1-sulfate],
- XXXV. [D-homoglutamic acid, N-sulfonic acid],
- XXXVI. [Pentane-2 $\beta$ , 5-dicarboxy-1-sulfonic acid],
- 15 XXXVII. [Pentane-2 $\beta$ , 5-dicarboxy-1-sulfate],
- XXXVIII. [Butane-1 $\beta$ , 4-dicarboxy-1-sulfonic acid],
- XXXIX. [Butane-1 $\beta$ , 4-dicarboxy-1-sulfate],

*P-126* <sup>39</sup><sub>40</sub> A composition as claimed in claim 29, wherein the compound is selected from the group consisting of

- 20 I. [D-homoglutamic acid, 3 $\alpha$ -sulfonic acid],
- II. [D-homoglutamic acid, 3 $\alpha$ -sulfate],
- III. [D-homoglutamic acid, 3 $\beta$ -sulfonic acid],
- IV. [D-homoglutamic acid, 3 $\beta$ -sulfate],
- V. [D-homoglutamic acid, 4 $\alpha$ -sulfonic acid],
- 25 VI. [D-homoglutamic acid, 4 $\alpha$ -sulfate],
- VII. [D-homoglutamic acid, 4 $\beta$ -sulfonic acid],
- VIII. [D-homoglutamic acid, 4 $\beta$ -sulfate],
- IX. [D-homoglutamic acid, 5 $\alpha$ -sulfate],
- X. [D-homoglutamic acid, 5 $\alpha$ -sulfate],
- 30 XI. [D-homoglutamic acid, 5 $\beta$ -sulfonic acid],

- XII. [D-homoglutamic acid, 5 $\beta$ -sulfate],
- XIII. [L-homoglutamine, N-sulfonic acid],
- XIV. [Pentane-2 $\alpha$ -carboxy, 5-carboxamido-1-sulfonic acid],
- XV. [Pentane-2 $\alpha$ -carboxy, 5-carboxamido-1-sulfate],
- 5 XVI. [Butane-1 $\alpha$ -carboxy, 4-carboxamido-1-sulfonic acid],
- XVII. [Butane-1 $\alpha$ -carboxy, 4-carboxamido-1-sulfate],
- XVIII. [D-homoglutamine, N-sulfonic acid],
- XIX. [Pentane-2 $\beta$ -carboxy, 5-carboxamido-1-sulfonic acid],
- XX. [Butane-1  $\beta$ -carboxy, 4-carboxamido-1-sulfonic acid],
- 10 XXI. [Butane-1  $\beta$ -carboxy, 4-carboxamido-1-sulfate],
- XXII. [D-homoglutamine, 3 $\alpha$ -sulfonic acid],
- XXIII. [D-homoglutamine, 3 $\alpha$ -sulfate],
- XXIV. [D-homoglutamine, 3 $\beta$ -sulfonic acid],
- XXV. [D-homoglutamine, 3 $\beta$ -sulfate],
- 15 XXVI. [D-homoglutamine, 4 $\alpha$ -sulfonic acid],
- XXVII. [D-homoglutamine, 4 $\alpha$ -sulfate],
- XXVIII. [D-homoglutamine, 4 $\beta$ -sulfonic acid],
- XXIX. [D-homoglutamine, 4 $\beta$ -sulfate],
- XXX. [D-homoglutamine, 5 $\alpha$ -sulfonic acid],
- 20 XXXI. [D-homoglutamine, 5 $\alpha$ -sulfate],
- XXXII. [D-homoglutamine, 5 $\beta$ -sulfonic acid] and
- XXXIII. [D-homoglutamine, 5 $\beta$ -sulfate].

*R-128* *404* A composition as claimed in claim 29, wherein novel sulfonic acid / sulfate derivatives of the formulae ZOC-CR<sub>3</sub>R<sub>4</sub>-CR<sub>1</sub>R<sub>2</sub>-COOH wherein: Z=OH or  
 25 NH<sub>2</sub>, R<sub>1</sub>, to R<sub>4</sub> denotes H, NH<sub>2</sub>, SO<sub>3</sub>H, or OSO<sub>3</sub>H, CH<sub>2</sub>-SO<sub>3</sub>H, CH<sub>2</sub>-OSO<sub>3</sub>H, NHSO<sub>3</sub>H

- I. A compound as claimed in claim 1, wherein Z=OH, R<sub>2</sub>=R<sub>3</sub>=R<sub>4</sub>=H, R<sub>1</sub>=NHSO<sub>3</sub>H is the same meaning as is before defined;
- II. A compound as claimed in claim 1, wherein Z=OH, R<sub>2</sub>=R<sub>3</sub>=R<sub>4</sub>=H, R<sub>1</sub>=CH<sub>2</sub>SO<sub>3</sub>H is the same meaning as is before defined;
- 30

- III. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_2=R_3=R_4=H$ ,  $R_1=CH_2OSO_3H$  is the same meaning as is before defined;
- IV. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_2=R_3=R_4=H$ ,  $R_1=SO_3H$  is the same meaning as is before defined;
- 5 V. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_2=R_3=R_4=H$ ,  $R_1=OSO_3H$  is the same meaning as is before defined;
- VI. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_1=R_3=R_4=H$ ,  $R_2=NHSO_3H$  is the same meaning as is before defined;
- VII. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_1=R_3=R_4=H$ ,  $R_2=CH_2SO_3H$  is the same meaning as is before defined;
- 10 VIII. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_1=R_3=R_4=H$ ,  $R_2=CH_2OSO_3H$  is the same meaning as is before defined;
- IX. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_1=R_3=R_4=H$ ,  $R_2=SO_3H$  is the same meaning as is before defined;
- 15 X. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_1=R_3=R_4=H$ ,  $R_2=OSO_3H$  is the same meaning as is before defined;
- XI. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_1=R_4=H$ ,  $R_2=NH_2$ ,  $R_3=SO_3H$  is the same meaning as is before defined;
- XII. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_1=R_4=H$ ,  $R_2=NH_2$ ,  $R_3=SO_3H$  is the same meaning as is before defined;
- 20 XIII. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_1=R_3=H$ ,  $R_2=NH_2$ ,  $R_4=SO_3H$  is the same meaning as is before defined;
- XIV. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_1=R_3=H$ ,  $R_2=NH_2$ ,  $R_4=OSO_3H$  is the same meaning as is before defined;
- 25 XV. A compound as claimed in claim 1, wherein  $Z=NH_2$ ,  $R_2=R_3=R_4=H$ ,  $R_1=NHSO_3H$  is the same meaning as is before defined;
- XVI. A compound as claimed in claim 1, wherein  $Z=NH_2$ ,  $R_2=R_3=R_4=H$ ,  $R_1=CH_2SO_3H$  is the same meaning as is before defined;
- XVII. A compound as claimed in claim 1, wherein  $Z=NH_2$ ,  $R_2=R_3=R_4=H$ ,  $R_1=CH_2OSO_3H$  is the same meaning as is before defined;
- 30

- XVIII. A compound as claimed in claim 1, wherein  $Z=\text{NH}_2$ ,  $R_2=R_3=R_4=\text{H}$ ,  $R_1=\text{SO}_3\text{H}$  is the same meaning as is before defined;
- XIX. A compound as claimed in claim 1, wherein  $Z=\text{NH}_2$ ,  $R_2=R_3=R_4=\text{H}$ ,  $R_1=\text{OSO}_3\text{H}$  is the same meaning as is before defined;
- 5 XX. A compound as claimed in claim 1, wherein  $Z=\text{NH}_2$ ,  $R_1=R_4=\text{H}$ ,  $R_2=\text{NH}_2$ ,  $R_3=\text{SO}_3\text{H}$  is the same meaning as is before defined;
- XXI. A compound as claimed in claim 1, wherein  $Z=\text{NH}_2$ ,  $R_1=R_4=\text{H}$ ,  $R_2=\text{NH}_2$ ,  $R_3=\text{OSO}_3\text{H}$  is the same meaning as is before defined;
- XXII. A compound as claimed in claim 1, wherein  $Z=\text{NH}_2$ ,  $R_1=R_3=\text{H}$ ,  $R_2=\text{NH}_2$ ,  
10  $R_4=\text{SO}_3\text{H}$  is the same meaning as is before defined;
- XXIII. A compound as claimed in claim 1, wherein  $Z=\text{NH}_2$ ,  $R_1=R_3=\text{H}$ ,  $R_2=\text{NH}_2$ ,  $R_4=\text{OSO}_3\text{H}$  is the same meaning as is before defined;
- XXIV. A compound as claimed in claim 1, wherein  $Z=\text{NH}_2$ ,  $R_1=R_3=R_4=\text{H}$ ,  $R_2=\text{NHSO}_3\text{H}$  is the same meaning as is before defined;
- 15 XXV. A compound as claimed in claim 1, wherein  $Z=\text{NH}_2$ ,  $R_1=R_3=R_4=\text{H}$ ,  $R_2=\text{CH}_2\text{SO}_3\text{H}$  is the same meaning as is before defined;
- XXVI. A compound as claimed in claim 1, wherein  $Z=\text{NH}_2$ ,  $R_1=R_3=R_4=\text{H}$ ,  $R_2=\text{CH}_2\text{OSO}_3\text{H}$  is the same meaning as is before defined;
- XXVII. A compound as claimed in claim 1, wherein  $Z=\text{NH}_2$ ,  $R_1=R_3=R_4=\text{H}$ ,  
20  $R_2=\text{SO}_3\text{H}$  is the same meaning as is before defined;
- XXVIII. A compound as claimed in claim 1, wherein  $Z=\text{NH}_2$ ,  $R_1=R_3=R_4=\text{H}$ ,  $R_2=\text{OSO}_3\text{H}$  is the same meaning as is before defined;
- XXIX. A compound as claimed in claim 1, wherein  $Z=\text{NH}_2$ ,  $R_1=R_4=\text{H}$ ,  $R_2=\text{NH}_2$ ,  $R_3=\text{SO}_3\text{H}$  is the same meaning as is before defined;
- 25 XXX. A compound as claimed in claim 1, wherein  $Z=\text{NH}_2$ ,  $R_1=R_4=\text{H}$ ,  $R_2=\text{NH}_2$ ,  $R_3=\text{OSO}_3\text{H}$  is the same meaning as is before defined;
- XXXI. A compound as claimed in claim 1, wherein  $Z=\text{NH}_2$ ,  $R_1=R_3=\text{H}$ ,  $R_2=\text{NH}_2$ ,  $R_4=\text{SO}_3\text{H}$  is the same meaning as is before defined;
- XXXII. A compound as claimed in claim 1, wherein  $Z=\text{NH}_2$ ,  $R_1=R_3=\text{H}$ ,  $R_2=\text{NH}_2$ ,  
30  $R_4=\text{OSO}_3\text{H}$  is the same meaning as is before defined.



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A composition as claimed in claim 29, wherein novel sulfonic acid / sulfate derivatives of the formulae  $ZOC-CR_3R_6-CR_3R_4-CR_1R_2-COOH$ , wherein:  $Z=OH$  or  $NH_2$ ,  $R_1$  to  $R_6$  denotes  $H$ ,  $NH_2$ ,  $SO_3H$ , or  $OSO_3H$ ,  $CH_2-SO_3H$ ,  $CH_2-OSO_3H$ ,  $NHSO_3H$

- 5 I. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_2=R_3=R_4=R_5=R_6=H$ ,  $R_1=NHSO_3H$  is the same meaning as is before defined;
- II. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_2=R_3=R_4=R_5=R_6=H$ ,  $R_1=CH_2SO_3H$  is the same meaning as is before defined;
- III. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_2=R_3=R_4=R_5=R_6=H$ ,  
10  $R_1=CH_2OSO_3H$  is the same meaning as is before defined;
- IV. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_2=R_3=R_4=R_5=R_6=H$ ,  $R_1=SO_3H$  is the same meaning as is before defined;
- V. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_2=R_3=R_4=R_5=R_6=H$ ,  $R_1=OSO_3H$  is the same meaning as is before defined;
- 15 VI. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_1=R_3=R_4=R_5=R_6=H$ ,  $R_2=OSO_3H$  is the same meaning as is before defined;
- VII. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_1=R_3=R_4=R_5=R_6=H$ ,  $R_2=SO_3H$  is the same meaning as is before defined;
- VIII. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_1=R_3=R_4=R_5=R_6=H$ ,  
20  $R_2=NHSO_3H$  is the same meaning as is before defined;
- IX. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_1=R_3=R_4=R_5=R_6=H$ ,  $R_2=CH_2SO_3H$  is the same meaning as is before defined;
- X. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_1=R_3=R_4=R_5=R_6=H$ ,  $R_2=CH_2OSO_3H$  is the same meaning as is before defined;
- 25 XI. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_1=R_4=R_5=R_6=H$ ,  $R_2=NH_2$ ,  $R_3=SO_3H$  is the same meaning as is before defined;
- XII. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_1=R_4=R_5=R_6=H$ ,  $R_2=NH_2$ ,  $R_3=OSO_3H$  is the same meaning as is before defined;
- XIII. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_1=R_3=R_5=R_6=H$ ,  $R_2=NH_2$ ,  $R_4=SO_3H$  is the same meaning as is before defined;
- 30

- XIV. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_1=R_3=R_5=R_6=H$ ,  $R_2=NH_2$ ,  $R_4=OSO_3H$  is the same meaning as is before defined;
- XV. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_1=R_4=R_3=R_6=H$ ,  $R_2=NH_2$ ,  $R_5=SO_3H$  is the same meaning as is before defined;
- 5 XVI. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_1=R_4=R_3=R_6=H$ ,  $R_2=NH_2$ ,  $R_5=OSO_3H$  is the same meaning as is before defined;
- XVII. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_1=R_3=R_5=R_4=H$ ,  $R_2=NH_2$ ,  $R_6=SO_3H$  is the same meaning as is before defined;
- XVIII. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_1=R_3=R_5=R_4=H$ ,  $R_2=NH_2$ ,  $R_6=OSO_3H$  is the same meaning as is before defined;
- 10 XIX. A compound as claimed in claim 1, wherein  $Z=NH_2$ ,  $R_2=R_3=R_4=R_5=R_6=H$ ,  $R_1=NHSO_3H$  is the same meaning as is before defined;
- XX. A compound as claimed in claim 1, wherein  $Z=NH_2$ ,  $R_2=R_3=R_4=R_5=R_6=H$ ,  $R_1=CH_2SO_3H$  is the same meaning as is before defined;
- 15 XXI. A compound as claimed in claim 1, wherein  $Z=NH_2$ ,  $R_2=R_3=R_4=R_5=R_6=H$ ,  $R_1=CH_2OSO_3H$  is the same meaning as is before defined;
- XXII. A compound as claimed in claim 1, wherein  $Z=NH_2$ ,  $R_2=R_3=R_4=R_5=R_6=H$ ,  $R_1=SO_3H$  is the same meaning as is before defined;
- XXIII. A compound as claimed in claim 1, wherein  $Z=NH_2$ ,  $R_2=R_3=R_4=R_5=R_6=H$ ,  $R_1=OSO_3H$  is the same meaning as is before defined;
- 20 XXIV. A compound as claimed in claim 1, wherein  $Z=NH_2$ ,  $R_1=R_3=R_4=R_5=R_6=H$ ,  $R_2=OSO_3H$  is the same meaning as is before defined;
- XXV. A compound as claimed in claim 1, wherein  $Z=NH_2$ ,  $R_1=R_3=R_4=R_5=R_6=H$ ,  $R_2=SO_3H$  is the same meaning as is before defined;
- 25 XXVI. A compound as claimed in claim 1, wherein  $Z=NH_2$ ,  $R_1=R_3=R_4=R_5=R_6=H$ ,  $R_2=NHSO_3H$  is the same meaning as is before defined;
- XXVII. A compound as claimed in claim 1, wherein  $Z=NH_2$ ,  $R_1=R_3=R_4=R_5=R_6=H$ ,  $R_2=CH_2SO_3H$  is the same meaning as is before defined;
- XXVIII. A compound as claimed in claim 1, wherein  $Z=NH_2$ ,  $R_1=R_3=R_4=R_5=R_6=H$ ,  $R_2=CH_2OSO_3H$  is the same meaning as is before defined;
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- XXIX. A compound as claimed in claim 1, wherein  $Z=\text{NH}_2$ ,  $R_1=R_4=R_5=R_6=\text{H}$ ,  $R_2=\text{NH}_2$ ,  $R_3=\text{SO}_3\text{H}$  is the same meaning as is before defined;
- XXX. A compound as claimed in claim 1, wherein  $Z=\text{NH}_2$ ,  $R_1=R_4=R_5=R_6=\text{H}$ ,  $R_2=\text{NH}_2$ ,  $R_3=\text{OSO}_3\text{H}$  is the same meaning as is before defined;
- 5 XXXI. A compound as claimed in claim 1, wherein  $Z=\text{NH}_2$ ,  $R_1=R_3=R_5=R_6=\text{H}$ ,  $R_2=\text{NH}_2$ ,  $R_4=\text{SO}_3\text{H}$  is the same meaning as is before defined;
- XXXII. A compound as claimed in claim 1, wherein  $Z=\text{NH}_2$ ,  $R_1=R_3=R_5=R_6=\text{H}$ ,  $R_2=\text{NH}_2$ ,  $R_4=\text{OSO}_3\text{H}$  is the same meaning as is before defined;
- XXXIII. A compound as claimed in claim 1, wherein  $Z=\text{NH}_2$ ,  $R_1=R_4=R_3=R_6=\text{H}$ ,  $R_2=\text{NH}_2$ ,  $R_5=\text{SO}_3\text{H}$  is the same meaning as is before defined;
- 10 XXXIV. A compound as claimed in claim 1, wherein  $Z=\text{NH}_2$ ,  $R_1=R_4=R_3=R_6=\text{H}$ ,  $R_2=\text{NH}_2$ ,  $R_5=\text{OSO}_3\text{H}$  is the same meaning as is before defined;
- XXXV. A compound as claimed in claim 1, wherein  $Z=\text{NH}_2$ ,  $R_1=R_3=R_5=R_4=\text{H}$ ,  $R_2=\text{NH}_2$ ,  $R_6=\text{SO}_3\text{H}$  is the same meaning as is before defined;
- 15 XXXVI. A compound as claimed in claim 1, wherein  $Z=\text{NH}_2$ ,  $R_1=R_3=R_5=R_4=\text{H}$ ,  $R_2=\text{NH}_2$ ,  $R_6=\text{OSO}_3\text{H}$  is the same meaning as is before defined.
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A composition as claimed in claim 29, wherein novel sulfonic acid / sulfate derivatives of the formulae  $\text{ZOC-CR}_7\text{R}_8\text{-CR}_5\text{R}_6\text{-CR}_3\text{R}_4\text{-CR}_1\text{R}_2\text{-COOH}$ , wherein:  $Z=\text{OH}$  or  $\text{NH}_2$ ,  $R_1$ , to  $R_8$  denotes  $\text{H}$ ,  $\text{NH}_2$ ,  $\text{SO}_3\text{H}$ , or  $\text{OSO}_3\text{H}$ ,  $\text{CH}_2\text{-SO}_3\text{H}$ ,  $\text{CH}_2\text{-OSO}_3\text{H}$ ,  $\text{NHSO}_3\text{H}$
- 20 I. A compound as claimed in claim 1, wherein  $Z=\text{OH}$ ,  $R_2=R_3=R_4=R_5=R_6=R_7=R_8=\text{H}$ ,  $R_1=\text{NHSO}_3\text{H}$  is the same meaning as is before defined;
- II. A compound as claimed in claim 1, wherein  $Z=\text{OH}$ ,  $R_2=R_3=R_4=R_5=R_6=R_7=R_8=\text{H}$ ,  $R_1=-\text{CH}_2\text{SO}_3\text{H}$  is the same meaning as is before defined;
- 25 III. A compound as claimed in claim 1, wherein  $Z=\text{OH}$ ,  $R_2=R_3=R_4=R_5=R_6=R_7=R_8=\text{H}$ ,  $R_1=\text{CH}_2\text{OSO}_3\text{H}$  is the same meaning as is before defined;
- IV. A compound as claimed in claim 1, wherein  $Z=\text{OH}$ ,  $R_2=R_3=R_4=R_5=R_6=R_7=R_8=\text{H}$ ,  $R_1=\text{SO}_3\text{H}$  is the same meaning as is before defined;
- V. A compound as claimed in claim 1, wherein  $Z=\text{OH}$ ,  $R_2=R_3=R_4=R_5=R_6=R_7=R_8=\text{H}$ ,  $R_1=\text{OSO}_3\text{H}$  is the same meaning as is before defined;
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- VI. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_1=R_3=R_4=R_5=R_6=R_7=R_8=H$ ,  $R_2=NHSO_3H$  is the same meaning as is before defined;
- VII. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_1=R_3=R_4=R_5=R_6=R_7=R_8=H$ ,  $R_2=CH_2SO_3H$  is the same meaning as is before defined;
- 5 VIII. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_1=R_3=R_4=R_5=R_6=R_7=R_8=H$ ,  $R_2=CH_2OSO_3H$  is the same meaning as is before defined;
- IX. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_1=R_3=R_4=R_5=R_6=R_7=R_8=H$ ,  $R_2=SO_3H$  is the same meaning as is before defined;
- X. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_1=R_3=R_4=R_5=R_6=R_7=R_8=H$ ,  $R_2=OSO_3H$  is the same meaning as is before defined;
- 10 XI. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_1=R_4=R_5=R_6=R_7=R_8=H$ ,  $R_2=NH_2$ ,  $R_3=SO_3H$  is the same meaning as is before defined;
- XII. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_1=R_4=R_5=R_6=R_7=R_8=H$ ,  $R_2=NH_2$ ,  $R_3=OSO_3H$  is the same meaning as is before defined;
- 15 XIII. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_1=R_3=R_5=R_6=R_7=R_8=H$ ,  $R_2=NH_2$ ,  $R_4=SO_3H$  is the same meaning as is before defined;
- XIV. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_1=R_3=R_5=R_6=R_7=R_8=H$ ,  $R_2=NH_2$ ,  $R_4=OSO_3H$  is the same meaning as is before defined;
- 20 XV. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_1=R_4=R_3=R_6=R_7=R_8=H$ ,  $R_2=NH_2$ ,  $R_5=SO_3H$  is the same meaning as is before defined;
- XVI. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_1=R_4=R_3=R_6=R_7=R_8=H$ ,  $R_2=NH_2$ ,  $R_5=OSO_3H$  is the same meaning as is before defined;
- 25 XVII. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_1=R_3=R_5=R_4=R_7=R_8=H$ ,  $R_2=NH_2$ ,  $R_6=SO_3H$  is the same meaning as is before defined;
- XVIII. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_1=R_3=R_5=R_4=R_7=R_8=H$ ,  $R_2=NH_2$ ,  $R_6=OSO_3H$  is the same meaning as is before defined;

- XIX. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_1=R_4=R_3=R_6=R_5=R_8=H$ ,  $R_2=NH_2$ ,  $R_7=SO_3H$  is the same meaning as is before defined;
- XX. A compound as claimed in claim 1, wherein  $Z=OH$ ,  
 5  $R_1=R_4=R_3=R_6=R_5=R_8=H$ ,  $R_2=NH_2$ ,  $R_7=OSO_3H$  is the same meaning as is before defined;
- XXI. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_1=R_3=R_5=R_4=R_7=R_6=H$ ,  $R_2=NH_2$ ,  $R_8=SO_3H$  is the same meaning as is before defined;
- 10 XXII. A compound as claimed in claim 1, wherein  $Z=OH$ ,  $R_1=R_3=R_5=R_4=R_7=R_6=H$ ,  $R_2=NH_2$ ,  $R_8=OSO_3H$  is the same meaning as is before defined;
- XXIII. A compound as claimed in claim 1, wherein  $Z=NH_2$ ,  $R_2=R_3=R_4=R_5=R_6=R_7=R_8=H$ ,  $R_1=NHSO_3H$  is the same meaning as is before defined;
- 15 XXIV. A compound as claimed in claim 1, wherein  $Z=NH_2$ ,  $R_2=R_3=R_4=R_5=R_6=R_7=R_8=H$ ,  $R_1=CH_2SO_3H$  is the same meaning as is before defined;
- XXV. A compound as claimed in claim 1, wherein  $Z=NH_2$ ,  $R_2=R_3=R_4=R_5=R_6=R_7=R_8=H$ ,  $R_1=CH_2OSO_3H$  is the same meaning as is before defined;
- XXVI. A compound as claimed in claim 1, wherein  $Z=NH_2$ ,  $R_2=R_3=R_4=R_5=R_6=R_7=R_8=H$ ,  $R_1=SO_3H$  is the same meaning as is before defined;
- 20 XXVII. A compound as claimed in claim 1, wherein  $Z=NH_2$ ,  $R_2=R_3=R_4=R_5=R_6=R_7=R_8=H$ ,  $R_1=OSO_3H$  is the same meaning as is before defined;
- XXVIII. A compound as claimed in claim 1, wherein  $Z=NH_2$ ,  $R_1=R_3=R_4=R_5=R_6=R_7=R_8=H$ ,  $R_2=NHSO_3H$  is the same meaning as is before defined;
- 25 XXIX. A compound as claimed in claim 1, wherein  $Z=NH_2$ ,  $R_1=R_3=R_4=R_5=R_6=R_7=R_8=H$ ,  $R_2=CH_2SO_3H$  is the same meaning as is before defined;
- XXX. A compound as claimed in claim 1, wherein  $Z=NH_2$ ,  $R_1=R_3=R_4=R_5=R_6=R_7=R_8=H$ ,  $R_2=SO_3H$  is the same meaning as is before defined;
- XXXI. A compound as claimed in claim 1, wherein  $Z=NH_2$ ,  $R_1=R_3=R_4=R_5=R_6=R_7=R_8=H$ ,  $R_2=OSO_3H$  is the same meaning as is before defined;
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- XXXII. A compound as claimed in claim 1, wherein  $Z=\text{NH}_2$ ,  $R_1=R_4=R_5=R_6=R_7=R_8=\text{H}$ ,  $R_2=\text{NH}_2$ ,  $R_3=\text{SO}_3\text{H}$  is the same meaning as is before defined;
- XXXIII. A compound as claimed in claim 1, wherein  $Z=\text{NH}_2$ ,  $R_1=R_4=R_5=R_6=R_7=R_8=\text{H}$ ,  $R_2=\text{NH}_2$ ,  $R_3=\text{OSO}_3\text{H}$  is the same meaning as is before defined;
- 5 XXXIV. A compound as claimed in claim 1, wherein  $Z=\text{NH}_2$ ,  $R_1=R_3=R_5=R_6=R_7=R_8=\text{H}$ ,  $R_2=\text{NH}_2$ ,  $R_4=\text{SO}_3\text{H}$  is the same meaning as is before defined;
- XXXV. A compound as claimed in claim 1, wherein  $Z=\text{NH}_2$ ,  $R_1=R_3=R_5=R_6=R_7=R_8=\text{H}$ ,  $R_2=\text{NH}_2$ ,  $R_4=\text{OSO}_3\text{H}$  is the same meaning as is before defined;
- 10 XXXVI. A compound as claimed in claim 1, wherein  $Z=\text{NH}_2$ ,  $R_1=R_4=R_3=R_6=R_7=R_8=\text{H}$ ,  $R_2=\text{NH}_2$ ,  $R_5=\text{SO}_3\text{H}$  is the same meaning as is before defined;
- XXXVII. A compound as claimed in claim 1, wherein  $Z=\text{NH}_2$ ,  $R_1=R_4=R_3=R_6=R_7=R_8=\text{H}$ ,  $R_2=\text{NH}_2$ ,  $R_5=\text{OSO}_3\text{H}$  is the same meaning as is before defined;
- 15 XXXVIII. A compound as claimed in claim 1, wherein  $Z=\text{NH}_2$ ,  $R_1=R_3=R_5=R_4=R_7=R_8=\text{H}$ ,  $R_2=\text{NH}_2$ ,  $R_6=\text{SO}_3\text{H}$  is the same meaning as is before defined;
- XXXIX. A compound as claimed in claim 1, wherein  $Z=\text{NH}_2$ ,  $R_1=R_3=R_5=R_4=R_7=R_8=\text{H}$ ,  $R_2=\text{NH}_2$ ,  $R_6=\text{OSO}_3\text{H}$  is the same meaning as is before defined;
- 20 XL. A compound as claimed in claim 1, wherein  $Z=\text{NH}_2$ ,  $R_1=R_4=R_3=R_6=R_5=R_8=\text{H}$ ,  $R_2=\text{NH}_2$ ,  $R_7=\text{SO}_3\text{H}$  is the same meaning as is before defined;
- XLI. A compound as claimed in claim 1, wherein  $Z=\text{NH}_2$ ,  $R_1=R_4=R_3=R_6=R_5=R_8=\text{H}$ ,  $R_2=\text{NH}_2$ ,  $R_7=\text{OSO}_3\text{H}$  is the same meaning as is before defined;
- 25 XLII. A compound as claimed in claim 1, wherein  $Z=\text{NH}_2$ ,  $R_1=R_3=R_5=R_4=R_7=R_6=\text{H}$ ,  $R_2=\text{NH}_2$ ,  $R_8=\text{SO}_3\text{H}$  is the same meaning as is before defined;
- XLIII. A compound as claimed in claim 1, wherein  $Z=\text{NH}_2$ ,  $R_1=R_3=R_5=R_4=R_7=R_6=\text{H}$ ,  $R_2=\text{NH}_2$ ,  $R_8=\text{OSO}_3\text{H}$  is the same meaning as is before defined;
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44 A composition as claimed in claim 29, wherein said compound is non-toxic salts selected from the group consisting of:

- I. [L- Aspartic acid, N-Sulfonic acid],
- II. [2 $\alpha$ ,3-dicarboxy, propane-1-sulfonic acid],
- 5 III. [2 $\alpha$ ,3-dicarboxy, propane-1-sulfate],
- IV. [1 $\alpha$ ,2-carboxy ethane sulfonic acid],
- V. [1 $\alpha$ ,2-carboxy ethane sulfate],
- VI. [D-aspartic acid, N-sulfonic acid],
- VII. [2 $\beta$ ,3-carboxy,propane-1-sulfonic acid],
- 10 VIII. [2 $\beta$ ,3-carboxy,propane-1-sulfate],
- IX. [1 $\beta$ ,2-carboxy ethane-1-sulfonic acid],
- X. [1 $\beta$ ,2-carboxy ethane-1-sulfate],
- XI. [D-aspartic acid, 3 $\alpha$  -sulfonic acid],
- XII. [D-aspartic acid, 3 $\alpha$ -sulfate],
- 15 XIII. [D-aspartic acid, 3 $\beta$ -sulfonic acid],
- XIV. [D-aspartic acid, 3 $\beta$ -sulfate],
- XV. [L-asparagine,N-sulfonic acid],
- XVI. [2 $\alpha$ -carboxy, 3-carboxamido, propane-1-sulfonic acid],
- XVII. [2 $\alpha$ -carboxy, 3-carboxamido, propane-1-sulfate],
- 20 XVIII. [1 $\alpha$ -carboxy, 2-carboxamido, ethane sulfonic acid],
- XIX. [1 $\alpha$ -carboxy, 2-carboxamido, ethane sulfate],
- XX. [L-asparagine, 3 $\alpha$ -sulfonic acid],
- XXI. [L-asparagine, 3 $\alpha$ -sulfate],
- XXII. [L-asparagine, 3 $\beta$ -sulfonic acid],
- 25 XXIII. [L-asparagine, 3 $\beta$ -sulfate],
- XXIV. [D-asparagine, N-sulfonic acid],
- XXV. [2 $\beta$ -carboxy, 3-carboxamido, propane-1-sulfonic acid],
- XXVI. [2 $\beta$ -carboxy, 3-carboxamido, propane-1-sulfate],
- XXVII. [1 $\beta$ -carboxy, 2-carboxamido, ethane sulfonic acid],
- 30 XXVIII. [1 $\beta$ -carboxy, 2-carboxamido, ethane sulfate],

- XXIX. [D-asparagine, 3 $\alpha$ -sulfonic acid],  
 XXX. [D-asparagine, 3 $\alpha$ -sulfate],  
 XXXI. [D-asparagine, 3 $\beta$ -sulfonic acid],  
 XXXII. [D-asparagine, 3 $\beta$ -sulfate],  
 5 XXXIII. [L-glutamic acid, N-sulfonic acid],  
 XXXIV. [2 $\alpha$ ,4-dicarboxy, butane-1-sulfonic acid],  
 XXXV. [2 $\alpha$ , 4-dicarboxy, butane-1-sulfate],  
 XXXVI. [1 $\alpha$ , 3-dicarboxy, propane sulfonic acid],  
 XXXVII. [1 $\alpha$ , 3-dicarboxy, propane sulfate],  
 10 XXXVIII. [1 $\beta$ , 3-dicarboxy, propane sulfate],  
 XXXIX. [1 $\beta$ , 3-dicarboxy, propane sulfonic acid],  
 44-45 A composition as claimed in claim 29, wherein said compound is non-toxic salts  
 selected from the group consisting of:  
 I. [D-glutamic acid, N-sulfonic acid],  
 15 II. [2 $\beta$ , 4-dicarboxy, butane-1-sulfonic acid],  
 III. [2 $\beta$ , 4-dicarboxy, butane-1-sulfate],  
 IV. [D-glutamic acid, 3 $\alpha$ -sulfonic acid],  
 V. [D-glutamic acid, 3 $\alpha$ -sulfate],  
 VI. [D-glutamic acid, 3 $\beta$ -sulfonic acid],  
 20 VII. [D-glutamic acid, 3 $\beta$ -sulfate],  
 VIII. [D-glutamic acid, 4 $\alpha$ -sulfonic acid],  
 IX. [D-glutamic acid, 4 $\alpha$ -sulfate],  
 X. [D-glutamic acid, 4 $\beta$ -sulfonic acid],  
 XI. [D-glutamic acid, 3 $\beta$ -sulfate],  
 25 XII. [L-glutamine, N-sulfonic acid],  
 XIII. [2 $\alpha$ -carboxy, 4-carboxamido, butane-1-sulfonic acid],  
 XIV. [2 $\alpha$ -carboxy, 4-carboxamido, butane-1-sulfate],  
 XV. [1 $\alpha$ -carboxy, 3-carboxamido, propane-1-sulfonic acid],  
 XVI. [1 $\alpha$ -carboxy, 3-carboxamido, propane-1-sulfate],  
 30 XVII. [1 $\beta$ -carboxy, 3-carboxamido, propane-1-sulfate],